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**Neuroscience-Spring 2012**

**Practice Exam for Midterm**

***Note: I wrote up these questions using our lectures from last year. While they are very similar—and often identical—to the ones used this year, some may vary slightly, so a couple of the questions on here might not have been covered in your lectures. If you find any errors or have any questions, please let me know. Also, I take no responsibility for you getting anything wrong on the real exam---this is merely practice for your benefit. Good luck!!***

1. Fast anterograde transport
2. is used for the transport of neurotransmitters
3. uses dynein
4. works at a rate of approximately 25 mm/day
5. moves substances from the axon to the cell body
6. none of the above
7. Which statement is true about axonotmesis?
8. Regeneration commonly occurs within 2-3 days
9. It is a more severe injury than neurotmesis
10. Demyelination commonly occurs
11. It is often seen in crush injury
12. None of the above
13. Use the Nernst equation to find the equilibrium potential for a neuron in a calcium solution where [Ca2+]in=10 mM and [Ca2+]out=1000 mM.
14. 58 mV
15. -58 mV
16. 116 mV
17. -116 mV
18. None of the above.
19. Gap junction channels are most often
20. selective for named ions
21. valence selective
22. composed of 2 connexins, each of which consists of 6 connexons
23. found in the mammalian nervous system
24. nonselective
25. The Na+/K+ pump
26. Works via a process where sodium is released extracellularly immediately following dephosphorylation.
27. Contributes to the resting potential.
28. Consists of 5 transmembrane spanning regions.
29. Consumes energy from ATP hydrolysis, just like the Na+/H+ exchanger.
30. None of the above
31. Which statement is true?
32. During resting potential, the primary gate is closed and the secondary gate is open.
33. Paramytonia Congenita (PMC) often involves a mutation in a Nav 1.3 channel.
34. The length constant increases as axoplasmic resistance is increased.
35. The time constant increases as capacitance decreases.
36. None of the above.
37. Consider the following statements: 1) The absolute refractory period is primarily due to sodium channel inactivation. 2) Multiple Sclerosis (MS) is an acute demyelinating disease in which the channels are clustered following demyelination, thus preventing the axon from working like a normal unmyelinated axon. 3) Class II axons have a faster conduction speed than class IV axons. 4) The relative refractory period is largely due to potassium channels overshooting the resting potential.

How many of the above statements are false?

1. 0
2. 1
3. 2
4. 3
5. 4
6. Studies of the resting membrane potential of the giant squid axon showed that increasing \_\_\_\_\_outside the axon \_\_\_\_\_ the axon’s potential.
7. Sodium; depolarized
8. Sodium; hyperpolarized
9. Potassium; depolarized
10. Potassium; hyperpolarized
11. Sodium and potassium; had identical effects on
12. Which statement is true about EPPs and MEPPs?
13. EPPs are dependent on extracellular [Ca2+] but MEPPs are not.
14. MEPPs are dependent on extracellular [Ca2+] but EPPs are not.
15. Both EPPs and MEPPs are dependent on extracellular [Ca2+].
16. Neither EPPs nor MEPPs are dependent on extracellular [Ca2+].
17. Consider the following statements: 1) SNAP-25 is a type of V-SNARE. 2) Synaptotagmin is a type of V-SNARE. 3) Syntaxin is a type of T-SNARE. 4) Synaptobrevin is a type of V-SNARE.

How many of the above statements are true?

1. 0
2. 1
3. 2
4. 3
5. 4
6. Which of these is true for an IPSP but not an EPSP?
7. Sodium and potassium channels are opened by chemical neurotransmitters.
8. There are no positive feedback cycles.
9. Hyperpolarization is produced which subsequently spreads to the axon hillock.
10. Signals are transmitted across short distances.
11. The refractory period is absent.
12. Small-molecule neurotransmitters are synthesized
13. At the axon terminals
14. In the ER
15. In the Golgi Apparatus
16. B and C
17. None of the above
18. Color blindness can result from mutations in channels that are targeted by certain specific G-proteins. These G-proteins also affect the levels of all of the following except
19. PKA
20. Adenylyl cyclase
21. cAMP
22. PKC
23. All of the above are affected by these G –proteins.
24. Which of the following neurotransmitters does not have a receptor type that has effects on either potassium conductance or phospholipase C levels?
25. Dopamine
26. Norepinephrine
27. Acetylcholine
28. GABA
29. Glutamine
30. The predominant cholinergic receptor in the CNS
31. Is the receptor involved in Myasthenia Gravis
32. Has atropine as an antagonist
33. Has action which is fast, but can be either excitatory or inhibitory
34. Has 3 subtypes responsible for decreasing adenylyl cyclase, and 2 subtypes responsible for increasing phospholipase C.
35. None of the above
36. Which of the following correctly matches the scientist with the main result of their experiment(s) (as presented in the neurochemistry lectures)?
37. Ramon-y-Cajal/Acetylcholine is a neurotransmitter
38. Dale/Neurons are individual cells
39. Loewi/Ach is a neurotransmitter
40. Ramon-y-Cajal/Neurons use chemical synapses
41. Loewi/Neurons use chemical synapses
42. Sarin is a poisonous nerve gas which
43. Blocks an enzyme responsible for catalyzing a reaction which produces acetyl-CoA
44. Blocks choline acetyltransferase
45. Causes, among other symptoms, constriction of the blood vessels (vasoconstriction)
46. Blocks an enzyme responsible for catalyzing a reaction which produces acetate
47. Accelerates the breakdown of acetylcholine
48. Phenylethanolamine-N-methyltransferase
49. Catalyzes the rate-limiting step in catecholamine synthesis.
50. Catalyzes a reaction which produced norepinephrine
51. Catalyzes a reaction in which dopamine is a reactant
52. Does not require any cosubstrate
53. None of the above
54. The NMDA receptor is regulated by
55. Glutamate
56. Glycine
57. Tyrosine
58. Tryptophan
59. None of the above
60. There are numerous pathological conditions that result from neurotransmitter imbalance. For instances, loss of GABAergic and cholinergic cells of the striatum is associated with
61. Parkinson’s Disease
62. Myasthenia Gravis
63. Alzheimer’s Disease
64. Huntington’s Chorea
65. Schizophrenia
66. The external capsule can be found between the
67. Claustrum and cortex
68. Diencephalon and basal ganglia
69. Putamen and claustrum
70. Globus pallidus and cortex
71. Putamen and diencephalon
72. The Foramina of Luschka (aka lateral apertures) separate the \_\_\_\_\_\_ from the \_\_\_\_\_
73. 4th ventricle; pontine cistern (subarachnoid space)
74. 4th ventricle; cistern magna (subarachnoid space)
75. 3rd ventricle;4th ventricle
76. Lateral ventricle; 3rd ventricle
77. None of the above
78. Which of the following arteries is not a part of the Circle of Willis?
79. Superior cerebellar artery
80. Posterior cerebral artery
81. Posterior communicating artery
82. Internal carotid artery
83. Anterior communicating artery
84. Which layer of the neocortex is closest to white matter (of the choices given)?
85. External pyramidal layer
86. Molecular layer
87. Internal pyramidal layer
88. Internal granular layer
89. External granular layer
90. Which statement is true about the allocortex?
91. It comprises about 30% of the cerebral hemisphere
92. It consists of 3 layers
93. The entorhinal cortex is part of the archicortex
94. The paleocortex is involved in functions of the limbic system
95. New cell generation occurs in the dentate gyrus of the paleocortex
96. Which of the following is often given as a treatment for depression and why?
97. Desipramine, because it blocks serotonin reuptake.
98. Desipramine, because is blocks noradrenaline reuptake.
99. Fluoxetine, because it blocks noradrenaline reuptake.
100. Haloperidol, because it blocks dopamine receptors.
101. Diazepam, because it increases GABA inhibition.
102. Consider two axons, A and B. Their diameters differ by 4 microns. Approximately how many times faster is the conduction velocity of one axon than the other?
103. 1 m/sec
104. 6 m/sec
105. 12 m/sec
106. 20 m/sec
107. 24 m/sec
108. The density of which of the following receptor types is highest at the fingertips?
109. Merkel receptor
110. Pacinian corpuscle
111. Meissner corpuscle
112. Ruffini corpuscle
113. All of the above have equal densities at the fingertips.
114. Rapidly adapting fibers
115. Are generally well-suited to signal transient stimuli.
116. Discharge an action potential at the onset of a stimulus as well as during maintenance of the stimulus.
117. Include muscle spindles
118. Include pacinian corpuscles
119. More than one of the above is correct
120. A patient presents to your clinic with loss of pain, temperature, and crude touch sensation on the right side of their face. These symptoms could be caused by a lesion in which of the following places?
121. Left spinal trigeminal nucleus
122. Right spinal trigeminal nucleus
123. Left trigeminothalamic tract
124. Right trigeminothalamic tract
125. None of the above
126. The ability to identify the values of coins in your pocket without looking at them (i.e. by feeling them only) is dependent on which of the following structures being intact?
127. Lateral spinothalamic tract
128. Anterior spinothalamic tract
129. VPM
130. Medial lemniscus
131. All of the above.
132. A lesion of the ventral trigeminothalamic tract at the level of the midbrain on one side will result in:
133. Loss of pain, temperature, and crude touch on the ipsilateral face
134. Loss of pain, temperature, and crude touch on the contralateral face
135. Loss of fine touch and proprioception on the ipsilateral side of the body below the face.
136. More than one of the above is correct
137. None of the above are correct
138. Which of these are not axons of second-order neurons in a sensory pathway?
139. Fasciculus cuneatus
140. Medial lemniscus
141. Lateral spinothalamic tract
142. Trigeminothalamic tract
143. All of the above are axons of second order neurons in a sensory pathway.
144. While looking at a CT of a patient’s head, you notice a lesion indicating damage to the spinal trigeminal nucleus on the right side of the brainstem. Which of these sets of symptoms would you expect to see in the patient?
145. Inability to feel pain on the right side of the face
146. Inability to feel pain on the left side of the face
147. Inability to feel fine touch on the right side of the face
148. Inability to feel fine touch on the left side of the face
149. Inability to feel pain on the left side of the body below the face.
150. Lateral pontine syndrome (a lesion of the pons), which involves an injury of the lateral spinothalamic tract as well as the spinal trigeminal nucleus and tract would result in
151. Ipsilateral loss of pain and temperature from the body and contralateral loss of pain and temperature from the face.
152. Ipsilateral loss of pain and temperature from the face and contralateral loss of pain and temperature from the body.
153. Ipsilateral loss of touch and proprioception from the body and contralateral loss of pain and temperature from the face.
154. Ipsilateral loss of pain and temperature from the body and contralateral loss of touch and proprioception from the face.
155. None of the above
156. The nodose ganglion is involved in the pathway of sensory information from the \_\_\_\_\_\_ via \_\_\_\_\_\_.
157. Face and mouth; CN V
158. Thoracic and abdominal viscera; CN IX
159. Pinna, auditory canal, and eardrum; CN X
160. Pinna, auditory canal, and eardrum; CN VII
161. None of the above
162. There are 4 cortical areas that comprise the primary somatosensory cortex. Which area is responsible for processing pain inputs?
163. Area 3a
164. Area 3b
165. Area 1
166. Area 2
167. None of the above
168. An inability to recognize objects by touch is known as
169. Astereognosis
170. Atopognosis
171. Neuralgia
172. Paresthesia
173. Allodynia
174. Choose the correct statement about the visual system.
175. In response to light, rods hyperpolarize while cones depolarize.
176. While rods are found throughout the retina, cones are found only in the macula.
177. In the dark, Na+ and K+ ions enter the outer segment of the rod via rhodopsin channels.
178. Ganglion cells with OFF-center, On-surround receptive fields can be found in both the peripheral and macular parts of the retina.
179. None of the above.
180. Choose the correct statement about visual transduction.
181. Dark adaptation is indicative of rhodopsin regeneration.
182. In the dark, cGMP-gated sodium channels are normally closed.
183. Visual transduction takes more time in cones than in rods.
184. cGMP-gated sodium channels inactivate in response to photon absorption.
185. Rhodopsin consists of an opsin glycoprotein bound to inactive retinal as an 11-trans isomer.
186. Meyer’s loop is found
187. In the optic nerve
188. In the temporal lobe
189. In the parietal lobe
190. In the cerebral hemisphere, on the ventral surface
191. In the occipital lobe
192. Which statement is false about amblyopia and treatment thereof?
193. Most clinicians prefer nearly total patching of the dominant eye.
194. Atropine can be used to penalize the dominant eye during treatment
195. It is defined as a condition in which the eyes are misaligned.
196. Patching is usually discontinued once the child demonstrates midline alternate fixation.
197. None of the above (i.e. A-D are all true)
198. In terms of visual processing streams, P-type coding is directed toward the \_\_\_\_\_ lobe, while M-type coding is directed toward the \_\_\_\_\_ lobe.
199. Parietal; temporal
200. Temporal; parietal
201. Parietal; occipital
202. Occipital; temporal
203. Frontal; temporal
204. Consider the diagram. A patient with a lesion at the point marked “D” would be expected to have
205. A blind area in the left half of the left visual field and the right half of the right visual field.
206. A blind area in the left half of both the right and left visual fields.
207. A blind area in the right visual field only.
208. A blind area in the right half of the left visual field and the left half of the right visual field.
209. A blind area in 25% of each visual field.



1. Threshold pressure is defined as the amplitude of the quietest sound wave that a listener can detect. What is the amplitude of a sound wave that is 10,000 times louder than threshold?
2. 10 dB
3. 20 dB
4. 40 dB
5. 60 dB
6. 80 dB
7. Type II Auditory Nerve Fibers (ANFs)
8. Are myelinated
9. Synapse with a few inner hair cells.
10. Comprise the majority of ANFs
11. Have an unknown function
12. Are the primary source of input into ascending auditory pathways
13. Tinnitus
14. Is associated with damage to outer hair cells.
15. Is associated with loss of outer hair cells.
16. Is easily treatable, even if persistent
17. Is analogous to phantom limb sensation in amputees
18. None of the above.
19. The posteroventral division of the cochlear nuclei (PVCN)
20. Encodes sound intensity
21. Encodes sound onset
22. Projects to the ipsilateral lateral lemniscus
23. Projects to the superior olivary complex
24. Projects to the contralateral inferior colliculus
25. Vertical sound localization
26. Occurs in the dorsal cochlear nucleus (DCN)
27. Occurs in the PVCN
28. Occurs in the Anteroventral cochlear nucleus (AVCN)
29. Involves cues such as ILDs
30. None of the above
31. The vestibular nucleus has many projections to other structures. For instance, it sends projections to brainstem motor neurons via the
32. Inferior cerebellar peduncle
33. Commissural connections
34. Medial longitudinal fasciculus
35. Lateral vestibulospinal tract
36. Median vestibulospinal tract
37. The linear vestibule-ocular reflex (VOR)
38. Is mediated by otolithic organs
39. Compensates for rotation
40. Is used to stabilize body posture during head motion
41. Is involved in generation counter-movements to what has been detected by the vestibular sensors
42. None of the above
43. Repositioning is used as a treatment for which of the following vestibular disorders?
44. Benign Positional Vertigo
45. Vestibular Neuritis
46. Ménière's Disease
47. Perilymphatic Fistula
48. Dehiscence
49. A defected bony roof of a canal is indicative of which of the following disorders?
50. Dehiscence
51. Labyrinthitis
52. Endolymphatic Hydrops
53. Perilymphatic Fistula
54. Vertigo
55. Caloric irrigation is often used to test which reflex?
56. Vestibulo-Ocular (VOR)
57. Vestibulo-Spinal (VSR)
58. Vestibulo-Collic (VCR)
59. Vestibulo-Autonomic (VAR)
60. The knee-jerk reflex
61. Which ion is not involved in olfactory transduction?
62. Na+
63. K+
64. Ca2+
65. Cl-
66. All of the above are involved in olfactory transduction.
67. In the process of adaptation to odorants, which of the following is responsible for turning off adenyl cyclase III?
68. cAMP
69. PKA
70. Calmodulin
71. Calmodulin Kinase II
72. GPCR
73. A patient presents to your clinic. He complains of frequently smelling particularly noxious stimuli, yet no one else around him seems to smell anything. Based on what you’ve learned about the olfactory system, the patient is most likely experiencing
74. Anosmia
75. Hyposmia
76. Olfactory hallucinations
77. Münchausen Syndrome
78. An infection
79. Monosodium glutamate (MSG) is involved in the production of which taste sensation?
80. Sweet
81. Bitter
82. Sour
83. Savory
84. Salty
85. Foliate papillae transmit information to the CNS via which cranial nerve?
86. CN V
87. CN VII
88. CN IX
89. CN X
90. CN XII
91. Which taste sensation response is not mediated by GPCR?
92. Sweet
93. Salty
94. Bitter
95. Umami
96. Forget it. Only 4 choices for this one.